



## SEQUENCE LISTING

<110> Andersen, Kim  
Schulein, Martin  
Christiansen, Lars  
Damgaard, Bo  
Von Der Osten, Claus

<120> Cellulase Variants

<130> 4887.204-US

<140> 09/261,329

<141> 1999-03-03

<150> 1013/96

<151> 1996-09-17

<160> 26

<170> FastSEQ for Windows Version 3.0

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<212> PRT

<213> Cellulase variants

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35 40 45  
Pro Gly Gly Val Ala Tyr Ser Cys Ala Asp Gln Thr Pro Trp Ala Val  
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Asn Asp Asp Phe Ala Leu Gly Phe Ala Ala Thr Ser Ile Ala Gly Ser  
65 70 75 80  
Asn Glu Ala Gly Trp Cys Cys Ala Cys Tyr Glu Leu Thr Phe Thr Ser  
85 90 95  
Gly Pro Val Ala Gly Lys Lys Met Val Val Gln Ser Thr Ser Thr Gly  
100 105 110  
Gly Asp Leu Gly Ser Asn His Phe Asp Leu Asn Ile Pro Gly Gly Gly  
115 120 125  
Val Gly Ile Phe Asp Gly Cys Thr Pro Gln Phe Gly Gly Leu Pro Gly  
130 135 140  
Gln Arg Tyr Gly Gly Ile Ser Ser Arg Asn Glu Cys Asp Arg Phe Pro  
145 150 155 160  
Asp Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe Asp Trp Phe Lys Asn  
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Ala Asp Asn Pro Ser Phe Ser Phe Arg Gln Val Gln Cys Pro Ala Glu  
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<211> 202

<212> PRT

<213> Cellulase variants

<400> 2

Gly Ser Gly His Thr Thr Arg Tyr Trp Asp Cys Cys Lys Pro Ser Cys  
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Asn	Gly	Val	Ala	Phe	Thr	Cys	Asn	Asp	Asn	Gln	Pro	Trp	Ala	Val	Asn
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Asn	Asn	Val	Ala	Tyr	Gly	Phe	Ala	Ala	Thr	Ala	Phe	Pro	Gly	Gly	Asn
65					70					75				80	
Glu	Ala	Ser	Trp	Cys	Cys	Ala	Cys	Tyr	Ala	Leu	Gln	Phe	Thr	Ser	Gly
				85					90					95	
Pro	Val	Ala	Gly	Lys	Thr	Met	Val	Val	Gln	Ser	Thr	Asn	Thr	Gly	Gly
			100					105					110		
Asp	Leu	Ser	Gly	Thr	His	Phe	Asp	Ile	Gln	Met	Pro	Gly	Gly	Gly	Leu
		115					120					125			
Gly	Ile	Phe	Asp	Gly	Cys	Thr	Pro	Gln	Phe	Gly	Phe	Thr	Phe	Pro	Gly
	130					135					140				
Asn	Arg	Tyr	Gly	Gly	Thr	Thr	Ser	Arg	Ser	Gln	Cys	Ala	Glu	Leu	Pro
145					150					155				160	
Ser	Val	Leu	Arg	Asp	Gly	Cys	His	Trp	Arg	Tyr	Asp	Trp	Phe	Asn	Asp
				165					170					175	
Ala	Asp	Asn	Pro	Asn	Val	Asn	Trp	Arg	Arg	Val	Arg	Cys	Pro	Ala	Ala
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Leu	Thr	Asn	Arg	Ser	Gly	Cys	Val	Arg	Ala						
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<210> 3  
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 <212> PRT  
 <213> cellulase variants

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			20					25					30		
Arg	Asn	Asn	Asn	Pro	Leu	Ala	Ser	Thr	Ala	Arg	Ser	Gly	Cys	Asp	Ser
		35					40					45			
Asn	Gly	Val	Ala	Tyr	Thr	Cys	Asn	Asp	Asn	Gln	Pro	Trp	Ala	Val	Asn
	50					55				60					
Asp	Asn	Leu	Ala	Tyr	Gly	Phe	Ala	Ala	Thr	Ala	Phe	Ser	Gly	Gly	Ser
65					70					75				80	
Glu	Ala	Ser	Trp	Cys	Cys	Ala	Cys	Tyr	Ala	Leu	Gln	Phe	Thr	Ser	Gly
				85					90					95	
Pro	Val	Ala	Gly	Lys	Thr	Met	Val	Val	Gln	Ser	Thr	Asn	Thr	Gly	Gly
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Asp	Leu	Ser	Gly	Asn	His	Phe	Asp	Ile	Leu	Met	Pro	Gly	Gly	Gly	Leu
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Gly	Ile	Phe	Asp	Gly	Cys	Thr	Pro	Gln	Trp	Gly	Val	Ser	Phe	Pro	Gly
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Asn	Arg	Tyr	Gly	Gly	Thr	Thr	Ser	Arg	Ser	Gln	Cys	Ser	Gln	Ile	Pro
145					150					155				160	
Ser	Ala	Leu	Gln	Pro	Gly	Cys	Asn	Trp	Arg	Tyr	Asp	Trp	Phe	Asn	Asp
				165					170					175	
Ala	Asp	Asn	Pro	Asp	Val	Ser	Trp	Arg	Arg	Val	Gln	Cys	Pro	Ala	Ala
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Leu	Thr	Asp	Arg	Thr	Gly	Cys	Arg	Arg	Ala						
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 <213> Cellulase variants

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                   20                  25                  30  
 Ala Asn Asn Asn Pro Leu Asn Asp Ala Asn Val Lys Ser Gly Cys Asp  
                   35                  40                  45  
 Gly Gly Ser Ala Tyr Thr Cys Ala Asn Asn Ser Pro Trp Ala Val Asn  
                   50                  55                  60  
 Asp Asn Leu Ala Tyr Gly Phe Ala Ala Thr Lys Leu Ser Gly Gly Thr  
  65                  70                  75                  80  
 Glu Ser Ser Trp Cys Cys Ala Cys Tyr Ala Leu Thr Phe Thr Ser Gly  
                   85                  90                  95  
 Pro Val Ser Gly Lys Thr Leu Val Val Gln Ser Thr Ser Thr Gly Gly  
                   100                  105                  110  
 Asp Leu Gly Ser Asn His Phe Asp Leu Asn Met Pro Gly Gly Val  
                   115                  120                  125  
 Gly Leu Phe Asp Gly Cys Lys Arg Glu Phe Gly Gly Leu Pro Gly Ala  
                   130                  135                  140  
 Gln Tyr Gly Gly Ile Ser Ser Arg Ser Glu Cys Asp Ser Phe Pro Ala  
  145                  150                  155                  160  
 Ala Leu Lys Pro Gly Cys Gln Trp Arg Phe Asp Trp Phe Lys Asn Ala  
                   165                  170                  175  
 Asp Asn Pro Glu Phe Thr Phe Lys Gln Val Gln Cys Pro Ser Glu Leu  
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 Thr Ser Arg Thr Gly Cys Lys Arg Ala  
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 <213> Cellulase variants

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                   20                  25                  30  
 Ala Asn Phe Gln Arg Leu Ser Asp Phe Asn Val Gln Ser Gly Cys Asn  
                   35                  40                  45  
 Gly Gly Ser Ala Tyr Ser Cys Ala Asp Gln Thr Pro Trp Ala Val Asn  
                   50                  55                  60  
 Asp Asn Leu Ala Tyr Gly Phe Ala Ala Thr Ser Ile Ala Gly Gly Ser  
  65                  70                  75                  80  
 Glu Ser Ser Trp Cys Cys Ala Cys Tyr Ala Leu Thr Phe Thr Ser Gly  
                   85                  90                  95  
 Pro Val Ala Gly Lys Thr Met Val Val Gln Ser Thr Ser Thr Gly Gly  
                   100                  105                  110  
 Asp Leu Gly Ser Asn Gln Phe Asp Ile Ala Met Pro Gly Gly Val  
                   115                  120                  125  
 Gly Ile Phe Asn Gly Cys Ser Ser Gln Phe Gly Gly Leu Pro Gly Ala  
                   130                  135                  140  
 Gln Tyr Gly Gly Ile Ser Ser Arg Asp Gln Cys Asp Ser Phe Pro Ala  
  145                  150                  155                  160  
 Pro Leu Lys Pro Gly Cys Gln Trp Arg Phe Asp Trp Phe Gln Asn Ala  
                   165                  170                  175  
 Asp Asn Pro Thr Phe Thr Phe Gln Gln Val Gln Cys Pro Ala Glu Ile  
                   180                  185                  190  
 Val Ala Arg Ser Gly Cys Lys Arg Ala  
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 <213> Cellulase variants

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Ser Trp Ser Gly Lys Ala Ala Val Asn Ala Pro Ala Leu Thr Cys Asp  
 20 25 30  
 Lys Asn Asp Asn Pro Ile Ser Asn Thr Asn Ala Val Asn Gly Cys Glu  
 35 40 45  
 Gly Gly Gly Ser Ala Tyr Ala Cys Thr Asn Tyr Ser Pro Trp Ala Val  
 50 55 60  
 Asn Asp Glu Leu Ala Tyr Gly Phe Ala Ala Thr Lys Ile Ser Gly Gly  
 65 70 75 80  
 Ser Glu Ala Ser Trp Cys Cys Ala Cys Tyr Ala Leu Thr Phe Thr Thr  
 85 90 95  
 Gly Pro Val Lys Gly Lys Lys Met Ile Val Gln Ser Thr Asn Thr Gly  
 100 105 110  
 Gly Asp Leu Gly Asp Asn His Phe Asp Leu Met Met Pro Gly Gly Gly  
 115 120 125  
 Val Gly Ile Phe Asp Gly Cys Thr Ser Glu Phe Gly Lys Ala Leu Gly  
 130 135 140  
 Gly Ala Gln Tyr Gly Gly Ile Ser Ser Arg Ser Glu Cys Asp Ser Tyr  
 145 150 155 160  
 Pro Glu Leu Leu Lys Asp Gly Cys His Trp Arg Phe Asp Trp Phe Glu  
 165 170 175  
 Asn Ala Asp Asn Pro Asp Phe Thr Phe Glu Gln Val Gln Cys Pro Lys  
 180 185 190  
 Ala Leu Leu Asp Ile Ser Gly Cys Lys Arg Ala  
 195 200

<210> 7  
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 Ala Trp Pro Gly Lys Gly Pro Ser Ser Pro Val Gln Ala Cys Asp Lys  
 20 25 30  
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 35 40 45  
 Ala Gly Gly Ser Ala Tyr Met Cys Ser Ser Gln Ser Pro Trp Ala Val  
 50 55 60  
 Ser Asp Glu Leu Ser Tyr Gly Trp Ala Ala Val Lys Leu Ala Gly Ser  
 65 70 75 80  
 Ser Glu Ser Gln Trp Cys Cys Ala Cys Tyr Glu Leu Thr Phe Thr Ser  
 85 90 95  
 Gly Pro Val Ala Gly Lys Lys Met Ile Val Gln Ala Thr Asn Thr Gly  
 100 105 110  
 Gly Asp Leu Gly Asp Asn His Phe Asp Leu Ala Ile Pro Gly Gly Gly  
 115 120 125  
 Val Gly Ile Phe Asn Ala Cys Thr Asp Gln Tyr Gly Ala Pro Pro Asn  
 130 135 140  
 Gly Trp Gly Asp Arg Tyr Gly Gly Ile His Ser Lys Glu Glu Cys Glu  
 145 150 155 160  
 Ser Phe Pro Glu Ala Leu Lys Pro Gly Cys Asn Trp Arg Phe Asp Trp  
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 Phe Gln Asn Ala Asp Asn Pro Ser Val Thr Phe Gln Glu Val Ala Cys  
 180 185 190  
 Pro Ser Glu Leu Thr Ser Lys Ser Gly Cys Ser Arg Ala  
 195 200 205

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Arg	Asn	Gly	Asn	Thr	Leu	Gly	Pro	Asp	Val	Lys	Ser	Gly	Cys	Asp	Ser
		35					40					45			
Gly	Gly	Thr	Ser	Phe	Thr	Cys	Ala	Asn	Asn	Gly	Pro	Phe	Ala	Ile	Asp
	50					55					60				
Asn	Asn	Thr	Ala	Tyr	Gly	Phe	Ala	Ala	Ala	His	Leu	Ala	Gly	Ser	Ser
65				70						75				80	
Glu	Ala	Ala	Trp	Cys	Gln	Cys	Tyr	Glu	Leu	Thr	Phe	Thr	Ser	Gly	
			85					90					95		
Pro	Val	Val	Gly	Lys	Lys	Leu	Thr	Val	Gln	Val	Thr	Asn	Thr	Gly	Gly
			100					105					110		
Asp	Leu	Gly	Asn	Asn	His	Phe	Asp	Leu	Met	Ile	Pro	Gly	Gly	Gly	Val
		115					120					125			
Gly	Leu	Phe	Thr	Gln	Gly	Cys	Pro	Ala	Gln	Phe	Gly	Ser	Trp	Asn	Gly
	130				135						140				
Gly	Ala	Gln	Tyr	Gly	Gly	Val	Ser	Ser	Arg	Asp	Gln	Cys	Ser	Gln	Leu
145				150						155				160	
Pro	Ala	Ala	Val	Gln	Ala	Gly	Cys	Gln	Phe	Arg	Phe	Asp	Trp	Met	Gly
			165						170					175	
Gly	Ala	Asp	Asn	Pro	Asn	Val	Thr	Phe	Arg	Pro	Val	Thr	Cys	Pro	Ala
		180						185					190		
Gln	Leu	Thr	Asn	Ile	Ser	Gly	Cys	Val	Arg	Ala					
	195						200								

<210> 9  
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			20					25					30		
Ile	Asn	Asp	Asn	Ala	Gln	Thr	Pro	Ser	Asp	Leu	Leu	Lys	Ser	Ser	Cys
	35					40						45			
Asp	Gly	Gly	Ser	Ala	Tyr	Tyr	Cys	Ser	Asn	Gln	Gly	Pro	Trp	Ala	Val
	50				55						60				
Asn	Asp	Ser	Leu	Ser	Tyr	Gly	Phe	Ala	Ala	Ala	Lys	Leu	Ser	Gly	Lys
65				70						75				80	
Gln	Glu	Thr	Asp	Trp	Cys	Cys	Gly	Cys	Tyr	Lys	Leu	Thr	Phe	Thr	Ser
			85					90					95		
Thr	Ala	Val	Ser	Gly	Lys	Gln	Met	Ile	Val	Gln	Ile	Thr	Asn	Thr	Gly
			100					105					110		
Gly	Asp	Leu	Gly	Asn	Asn	His	Phe	Asp	Ile	Ala	Met	Pro	Gly	Gly	Gly
	115						120					125			
Val	Gly	Ile	Phe	Asn	Gly	Cys	Ser	Lys	Gln	Trp	Asn	Gly	Ile	Asn	Leu
	130				135						140				
Gly	Asn	Gln	Tyr	Gly	Gly	Phe	Thr	Asp	Arg	Ser	Gln	Cys	Ala	Thr	Leu
145				150						155				160	
Pro	Ser	Lys	Trp	Gln	Ala	Ser	Cys	Asn	Trp	Arg	Phe	Asp	Trp	Phe	Glu
			165					170						175	
Asn	Ala	Asp	Asn	Pro	Thr	Val	Asp	Trp	Glu	Pro	Val	Thr	Cys	Pro	Gln
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Glu	Leu	Val	Ala	Arg	Thr	Gly	Cys	Ser	Arg	Ala					
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			20					25					30		
Ser	Ala	Asn	Asn	Thr	Arg	Leu	Ser	Asp	Val	Ser	Val	Gly	Ser	Ser	Cys
		35					40					45			
Asp	Gly	Gly	Gly	Gly	Tyr	Met	Cys	Trp	Asp	Lys	Ile	Pro	Phe	Ala	Val
	50					55					60				
Ser	Pro	Thr	Leu	Ala	Tyr	Gly	Tyr	Ala	Ala	Thr	Ser	Ser	Gly	Asp	Val
65					70					75				80	
Cys	Gly	Arg	Cys	Tyr	Gln	Leu	Gln	Phe	Thr	Gly	Ser	Ser	Tyr	Asn	Ala
				85				90						95	
Pro	Gly	Asp	Pro	Gly	Ser	Ala	Ala	Leu	Ala	Gly	Lys	Thr	Met	Ile	Val
			100				105						110		
Gln	Ala	Thr	Asn	Ile	Gly	Tyr	Asp	Val	Ser	Gly	Gly	Gln	Phe	Asp	Ile
		115					120					125			
Leu	Val	Pro	Gly	Gly	Gly	Val	Gly	Ala	Phe	Asn	Ala	Cys	Ser	Ala	Gln
	130					135					140				
Trp	Gly	Val	Ser	Asn	Ala	Glu	Leu	Gly	Ala	Gln	Tyr	Gly	Gly	Phe	Leu
145				150						155				160	
Ala	Ala	Cys	Lys	Gln	Gln	Leu	Gly	Tyr	Asn	Ala	Ser	Leu	Ser	Gln	Tyr
				165					170					175	
Lys	Ser	Cys	Val	Leu	Asn	Arg	Cys	Asp	Ser	Val	Phe	Gly	Ser	Arg	Gly
			180					185					190		
Leu	Thr	Gln	Leu	Gln	Gln	Gly	Cys	Thr	Trp	Phe	Ala	Glu	Trp	Phe	Glu
		195					200					205			
Ala	Ala	Asp	Asn	Pro	Ser	Leu	Lys	Tyr	Lys	Glu	Val	Pro	Cys	Pro	Ala
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